

## REMARKS

The application includes claims 1-20 prior to entering this amendment.

The examiner rejected claims 1-11 and 14-19 under 35 U.S.C. § 102(b) as being unpatentable over Vo-Dinh et al. (U.S. Patent 6,197,503).

The examiner rejected claims 12 and 13 under 35 U.S.C. § 103(a) as being unpatentable over Vo-Dinh in view of Perov et al. (U.S. Patent 6,407,395).

The examiner rejected claim 20 under 35 U.S.C. § 103(a) as being unpatentable over Vo-Dinh in view of Miyazaki et al. (U.S. Patent 7,232,510).

The applicants amend claims 1-2, 8-14, 16-17, and 20.

The application remains with claims 1-20 after entering this amendment.

The applicants do not add new matter and request reconsideration.

### Claim Rejections Under §§ 102 and 103

The examiner rejected claims 1-11 and 14-19 under § 102 over Vo-Dinh. The examiner rejected claims 12 and 13 under § 103. The applicants respectfully traverse the examiner's rejections.

Claim 1 recites *a chip to generate a time-dependent analog signal in response to an enzyme reaction initiated by a specific component of a specimen making contact with the chip*. Claim 14 recites *generating a time-dependent analog signal in response to a content of a specific component of the specimen initiating an enzyme reaction on a chip of a biosensor*.

The examiner reasoned that the combination of Vo-Dinh's photodiode 300, amplifier 302, and multiplexer 301<sup>1</sup> disclose the recited chip. The examiner indicated "highly integrated biosensors are made possible partly [sic] through the capability of fabricating multiple optical sensing elements and microelectronics on a single integrated circuit (IC)."<sup>2</sup> Vo-Dinh discloses "a self contained miniature DNA biosensor designed to detect specific molecular targets, particularly suited for detection of nucleic acids."<sup>3</sup> Vo-Dinh's DNA biosensor comprises

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<sup>1</sup> Office action dated 11/19/2007, page 1. The examiner indicates element 306, together with the photodiode 300 and the amplifier 302, disclose the recited chip. Element 306 is not identified in the specification. In Figure 13, however, element 306 appears to point to the multiplexer 301. As such, the applicants assume that element 306 and multiplexer 301 are one in the same.

<sup>2</sup> Office action dated 11/19/2007, page 1.

<sup>3</sup> Vo-Dinh, abstract.

multiple biological sensing elements termed DNA probes.<sup>4</sup> The DNA probes “are designed to fluorescence when hybridized to their targets.”<sup>5</sup> Vo-Dinh detects this “fluorescence” or light from the DNA probes using an array of photodiodes.<sup>6</sup> Vo-Dinh discloses several schemes for reading the array of photodiodes, including the partially parallel readout scheme shown in Figure 13.<sup>7</sup> The photodiodes, alone or in combination with the multiplexer 301 and the amplifier 302, therefore, cannot disclose a chip that generates *a time-dependent analog signal in response to an enzyme reaction initiated by a specific component of a specimen making contact with the chip*. Vo-Dinh’s photodiodes 300 are optical elements that typically produce a current responsive to a detected light source. The photodiodes 300 do not operate *responsive to an enzyme reaction caused by a specific component of a specimen*. Even if the examiner were to propose that Vo-Dinh’s photodiodes 300 operate responsive to the DNA probes, that, in turn, operate to responsive to *a content of a specific component of a specimen* as claim 1 previously recited, the DNA probes do not operate responsive to *specimen making contact* with the photodiodes 300 as is required by the claims.

Claim 1 recites *a multi-channel A/D converter with multiple channels each of which is configured to simultaneously receive the time-dependent analog signal in each sampling interval*. Claim 14 recites *simultaneously sending the time-dependent analog signal to each channel of a multi-channel A/D converter for converting to a set of digital signals during each sampling time*.

The examiner indicates that Vo-Dinh’s A/D converter 304 discloses the recited multi-channel A/D converter. Vo-Dinh’s A/D converter 304 receives the multiplexed signals output from the various rows 310 of photodiodes 300.<sup>8</sup> For example, a first channel of the A/D converter 304 may receive a signal from one photodiode 300 in one row 310 selected by one multiplexer 310, while a second channel of the A/D converter 304 receives a signal from another diode 300 in another 310 selected by another multiplexer 310. The claims, however, recited a multi-channel A/D converter in which each of the channels receives *the* time-dependent analog

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<sup>4</sup> Id.

<sup>5</sup> Vo-Dinh, column 1, lines 20-21.

<sup>6</sup> See, e.g., Vo-Dinh, column 16, lines 37-56, and Figure 7.

<sup>7</sup> See also, Vo-Dinh, column 10, lines 51-61, and Example 12.

<sup>8</sup> See Vo-Dinh, Figure 13.

signal. Put differently, the claims recite a multi-channel A/D converter that simultaneously receives the same time-dependent analog signal  $V_{out}$ <sup>9</sup> simultaneously in each channel.

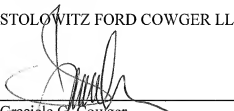
### **Conclusion**

For the foregoing reasons, the applicants request reconsideration and allowance of claims 1-20. The applicants encourage the examiner to telephone the undersigned if it appears that an interview would be helpful in advancing the case.

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Respectfully submitted,

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<sup>9</sup> Application, Figure 5.  
AMENDMENT